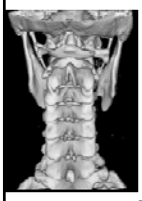
Cervical Spine Injuries in The Work Comp Population



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www.premierspinecare.com

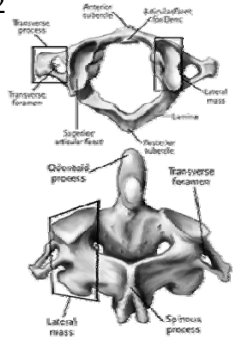
Outline

- Basics
  - Definitions
  - Anatomy of Cervical Spine
  - Diagnosis
  - Treatment
  - How to Efficiently Plan for Treatment

Cervical Bone Anatomy

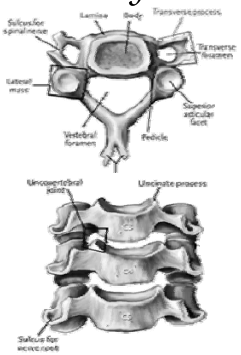
Upper C-Spine, C1&2

- **C1- Superior View Shown**
  - Called the "Atlas"
  - No Vertebral Body
  - Wide Lateral Masses Support the Skull
  - Majority of Flex/Ext
- **C2- Posterior View Shown**
  - Called the "Axis"
  - Odontoid Process (Dens) is Pivot Point for the Atlas
  - Majority of Rotation



Cervical Bone Anatomy

Sub-Axial (Lower) Cervical Spine C3-7



- **C3-7 have Similar Features**:
  - Lateral Masses with Facets
  - Large Vertebral Foramina
  - Uncinate Processes form Uncovertebral Joints (Joints of Luschka)
  - Vertebral Artery Foramen
- Key Anatomical Landmarks:
  - Carotid tubercle – C6
  - Vertebral Prominens – C7

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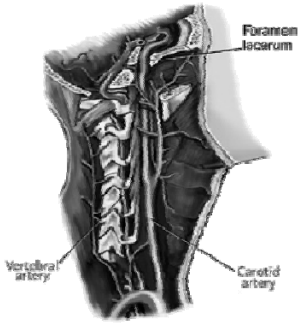
Cervical Arteries

- **Vertebral arteries (2)**
  - Transverse Foramen C6-C1
  - Enter Through Foramen Magnum
- **Carotid arteries (2)**
  - Anterolateral to Vertebral Bodies
  - Enter Through Foramen Lacerum



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Cervical Conditions Based On Symptoms & Anatomy

- **Axial/Mechanical Causes ➔ Neck Pain**
  - Problems with Bone, Facet Joints, Discs, Ligaments, and/or Muscles
  - Causes: Muscle Strain, Degeneration, Instability, Fracture
  - Generally called **Myofascial Pain**
- **Nerve Root ➔ Pain, Numbness, Weakness**
  - **Causes:** Disc Herniation, Spinal Stenosis = **Radiculopathy**
- **Spinal Cord ➔ Gait, Coordination, Bowel/Bladder**
  - Compression/ Dysfunction of Spinal Cord (CNS)
  - Causes: Spinal Stenosis, Ligament Ossification = **Myelopathy**

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Initial Evaluation

- Diagnosis (is it Actually a Cervical Spine Problem?)
- Causation
- Examination
- Treatment Plan
- Patient Education

Work Injury?

- Symptoms May Develop Suddenly with or without a Major Traumatic Event
- Usually Complain of a Combination of Pain/Numbness/Tingling in a Dermatomal Distribution
- Most Legitimate Patients will have Radiographic Degenerative Changes with a Symptom Inciting Event (the **Prevailing Factor**)

Injury?

- Need to Correlate Radiographic Findings with Clinical Complaints
- Do the Complaints Match the Injury and the Radiographic Findings?
- Most Work-Related Injuries will be Caused by Disc Pathology or the Development of Radiculopathy from Underlying Degeneration

Everybody has "Arthritis"

- (Boden et. al., *JBJS*, 1990) **MRI in 63 <u>Asymptomatic</u> Volunteers**:
- 19% Younger than 40 and 28% Older than 40 Showed Bulging Discs, HNP, or Foraminal Stenosis
- 25% Younger than 40 and 56% Older than 40 Showed Degenerative Discs (Decreased Signal on T2 Images)

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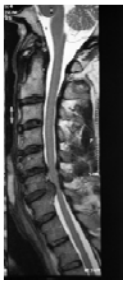
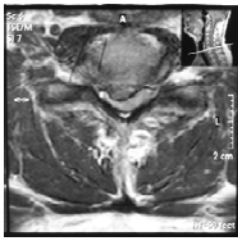
52 y.o. Carpenter: C6/7 Disc Herniation: Where is His Pain?





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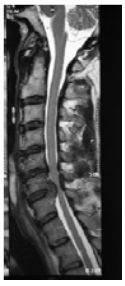
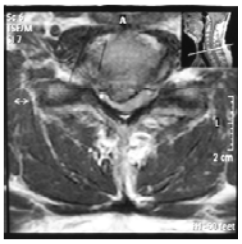
Minimal Radicular Pain. The Pain was from a Rotator Cuff Tear!!





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The Golden Rule

TREAT THE PATIENT, NOT THE PICTURE

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Physical Examination

- Standing
  - Gait/Balance
  - Palpation of Paraspinal Muscles/Medial Scapular Borders
  - Forward Flexion/Hyperextension of Low Back

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Physical Examination

- Seated
  - ROM: Flex/Ext/Rotation/Side Bending
  - Spurling's Sign
  - Muscle Strength: Deltoid/Biceps/Triceps/Wrist Flexors & Extensors/Intrinsics
  - Shoulder Exam!
  - Peripheral Nerve Exam (Wrist/Elbows)

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Physical Examination

- Seated
  - Sensation: Light Touch and Pin Prick
  - Reflexes: Biceps/Triceps/Brachioradialis /Knees/Ankles
  - Hoffman's Sign
  - Clonus
  - Babinski Reflex

Imaging Modalities

- Plain X-Rays, including Flexion/Extension, especially for Trauma
- MRI – Sensitive Modality for Cervical Soft Tissue Elements (Discs, etc). Often used as Initial Imaging Study for Cervical Radiculopathy. My Personal Imaging Study of Choice. Non-Invasive
- CT Myelography – Helpful for Bony Compression. Invasive. Usually Unnecessary unless MRI is Contraindicated

Cervical Conditions– Most Common

- Herniated Discs & Radiculopathy
- Mild Trauma - Neck Strain- "Whiplash"
- Disc Degeneration, Stenosis, Radiculopathy & Myelopathy
- Severe Trauma- Fractures & Dislocations, Possible Nerve Root & Spinal Cord Trauma

Cervical Radiculopathy

- Radiculopathy: Symptoms Caused by Compression of a Specific Nerve Root
- This is the Most Common Type of Cervical Spine Issue in the Work Comp Patient (other than a minor strain)

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Radiculopathy

- A Clinical Diagnosis
- 4% of Population is on Long-Term Disability for Neck Pain/Radiculopathy
- Represents Compression of an Exiting Nerve Root by either a Herniated Disc, Cervical Spondylotic Changes, Cervical Instability, or Congenital Deformity

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Radiculopathy

- Majority of Radiculopathies Resolve with Conservative Treatment
- Surgery is Always a Last Resort Consideration & Ultimately a Quality of Life Decision (not made by surgeon)

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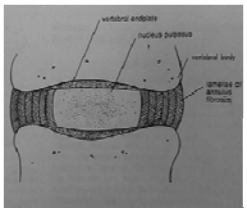

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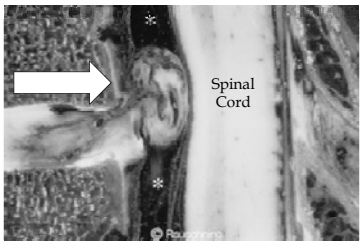
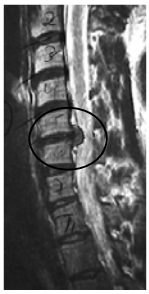
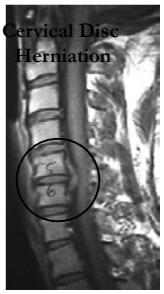
Cervical Disc Herniation

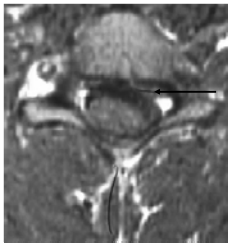
- Cervical Discs:
  - Smaller Nucleus Pulposus than Lumbar Discs
- Most Cervical Herniations occur Posterolaterally, with Compression and Irritation of the Spinal Nerve



Cervical Disc Herniation







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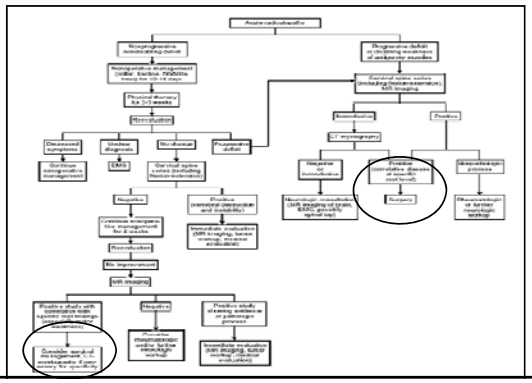
Operative vs. Non-operative



Non-Operative Management

- NSAIDs, Antispasmodics, Occasional Narcotics
- Epidural Steroid Injections: Not Completely Benign but Overall Favorable Risk Profile in the Right Hands
- Oral Steroids not Generally Recommended, Unless Injections not Immediately Available

Non-Operative Management

- Physical Therapy/Chiropractic – for Strengthening of Paraspinal Muscles, Heat/Cold Therapy, Electrical Stimulation for Spasm
- Cervical Traction –Thought to Relieve Pressure on Nerve Root, Increase Blood Flow and Decrease Ischemia
- Time, Time, Time 

Operative Management

- Considered if:
  - Progressive Neurologic Deficit
  - Disabling Neurologic Deficit, eg. Severe Weakness or Myelopathy
  - Unresponsive Non-Operative Management for at ***Least*** 6 Weeks if Possible

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Surgical Options

- Anterior Cervical Discectomy and Fusion (ACDF)
- Posterior Lamino-Foraminotomy

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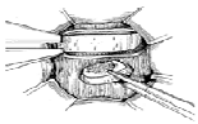
- First Described by Robinson & Smith (1955)
- Stabilizes Motion Segment, Direct Decompression of Canal and Foramen, Minimized Need for Manipulation of Spinal Cord and/or Nerve Root
- Treatment of Choice for Radiculopathy with Axial Neck Pain, Centrally Located Disease or if There is any Degree of Segmental Kyphosis



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ACDF

- 94% Good/Excellent Outcome for Single Level Pathology with Radiculopathy
- Majority of Cervical Spine Pathology Needs to be Addressed with an Anterior Approach for Safety of the Spinal Cord and for the Best Chance of a Good Clinical Outcome

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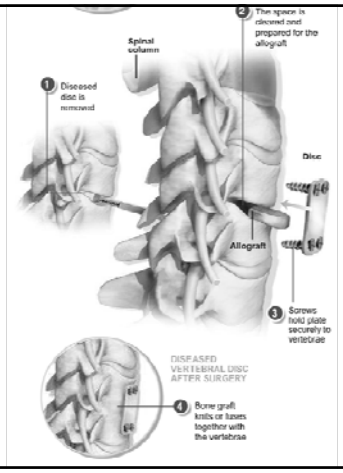
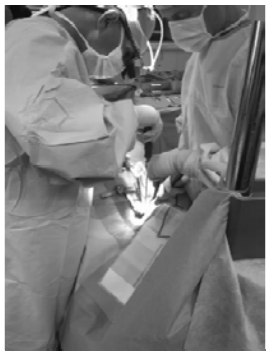


ACDF



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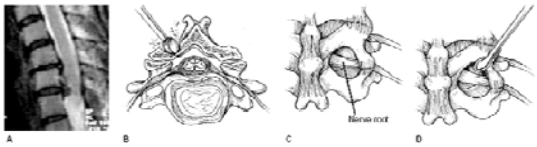
Posterior Laminoforaminotomy

- Allows Decompression of Facet Joint and Lamina if Necessary
- 75% Good/Excellent Outcome for Single Level Pathology with Radiculopathy with Appropriate Posterior/Lateral Pathology



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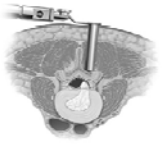
Posterior Lamino-Foraminotomy

- Posterior Exposure can be Much More Invasive than Anterior Approach
- Minimally Invasive Exposure Tubes don't Strip the Muscles and are less Invasive



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Post-op Course

- It is **CRITICAL** to Have a Consistent Post-Op Plan When Managing Work Comp Patients
- Any Post-Op Patient, Work Comp or Otherwise, can have Post-Op Issues and Need to be Evaluated Individually, but some of the other Secondary Gain Issues can be Avoided by a Consistent Plan Outlined Pre-Operatively
- Not the Environment to "Fly by the Seat of Your Pants"

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Post-op Course

- Maximum of 6 Weeks @ Temp Total Disability
- 6 Weeks @ Restricted Duties
- Anticipated Return to Full Duty with No Restrictions @ 3 Months (Based on Radiographs, not Subjective Complaints)
- Patients are Made Fully Aware of Post-Op Expectations in Writing Prior to Surgery

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How to Plan for Reserves

- It is Always a Challenge to Plan Reserves for a Specific Patient
- Here is an Outline of a Typical Course of 2 of our Most Common Diagnoses
- These are, of Course, Ideal Circumstances and not Every Patient will Follow this Exactly, but Having a Plan is Critical to Efficient Management

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Cervical Strain

- Typically Seen by Occupational Health Initially
- 2-4 weeks of PT Pursued, Occasionally Repeated, with Light Duty Restrictions
- If no Improvement, MRI Usually Ordered and the Patient is Referred on to Either a Spine Surgeon or PM&R

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Cervical Strain

- Additional PT Usually Ordered, 3 Times/Week for a Month
- At that Point Usually Released at MMI, Regardless of Whether They are Asymptomatic
- Majority of Recovery in 2-3 Months Following a Strain, the Rest is Time Dependent and Work Activities are Part of Rehab. Avoid Invasive Treatments

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Cervical Radiculopathy

- Early Course Usually Consistent with That of a Strain, Although not Unreasonable to Get an Early MRI
- If There are Significant MRI Findings, a Referral to a Surgeon is Usually Made
- Based on Exam; Observation, PT, ESI or Surgery Recommended

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Single Level Radiculopathy

- PT not Always Effective in Significant Radiculopathy
- ESIs are the Big Gun Symptomatic Treatment, not Usually Long-Term Treatment, but 3 Good Reasons to Try Them:
- Long Term in Small Percentage, Diagnostic in Most & Improve Surgical Outcome

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Single Level Radiculopathy

- If All Else Fails, and the Patient and Problem are Surgically Fixable, a Surgical Option May Become the Definitive Final Recommendation
- I Will Outline a Routine Patient that Goes Through a Single Level ACDF

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Single Level ACDF

- 4 Weeks of PT
- MRI (preferably closed)
- ESI times 2
- Single Level ACDF, codes 22551, 22845, 22851, 20936, 76000, Occasionally 63081/63082
- Hospital Codes Based on Surgical Codes

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Post-OP ACDF

- 6 Weeks on TTD
- 6 Weeks on Restricted Duties
- 21 Post-OP PT Visits
- Probable Return to Ordinary Duties at MMI 3 Months after Surgery
- Unlikely to Have Permanent Restrictions or Require FCE

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A Word on Ratings

- Ratings Should be Based on the **Symptoms Following the Injury,** not on Subjective Complaints at the Completion of Treatment or even the Treatment Pursued (eg. Surgery)
- See AMA Guides to Impairment 4th Edition, Page 100, 2nd Paragraph

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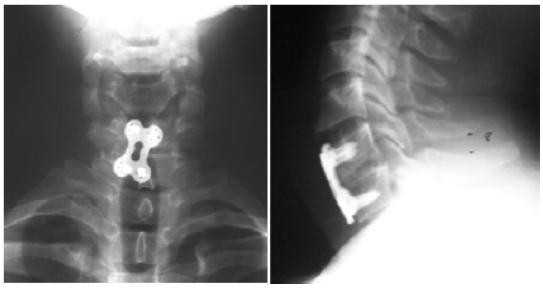
Plate Placement Matters

First, Do No Harm



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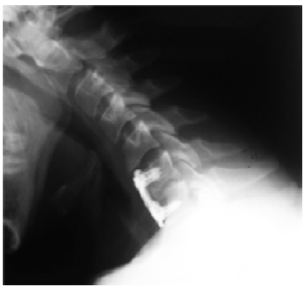
Under Flexion



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Do It Right the First Time

- Failed Surgery on a Work Comp Patient Resulting in Revision Surgery More than ***Quadruples*** the Overall Cost of the Claim
- This Includes Additional Surgical Costs (Higher than the First Procedure), Lost Time from Work, Additional Settlement Costs and a Greater Chance of Disability
- Even if Costs Appear Higher Initially, it is Always More Cost-Effective to Fix it Once

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Do It Right the First Time

- Off Work More than 12 Months from the Time of Injury Dramatically Reduces the Chance of Return to Pre-Injury Work Status
- The Average Time to Revision for a Failed First Attempt is 2.5 Years
- Control the Variables that You Can, there will certainly be many that you can't

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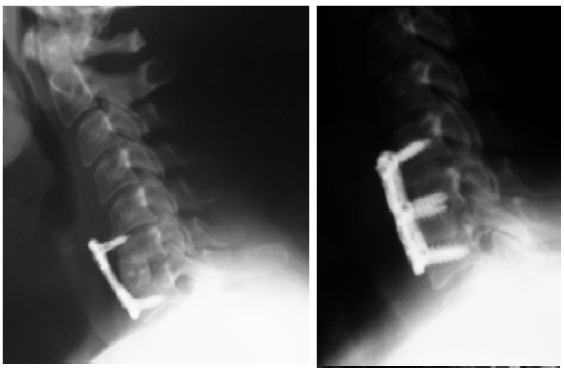

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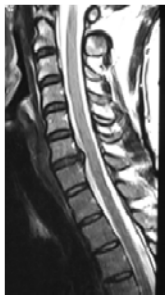
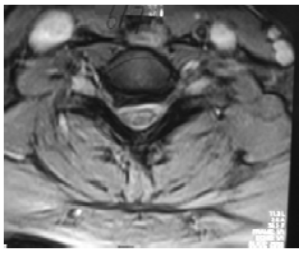
38 yo Nurse

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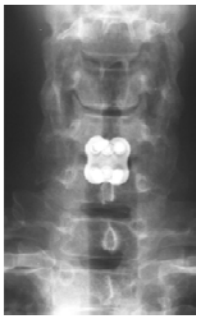
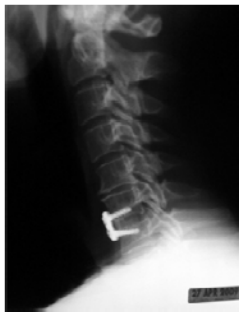
@ 3 weeks post-op

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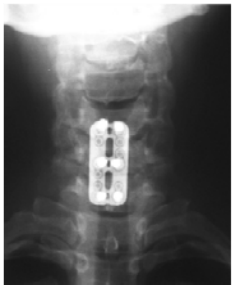
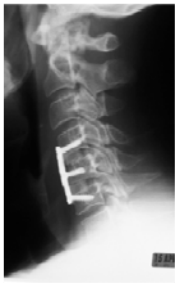
52 yo Firefighter
@ 3 weeks post-op

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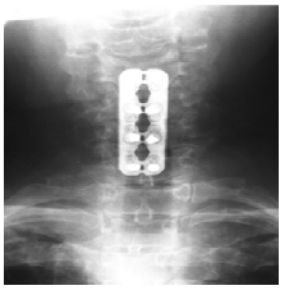
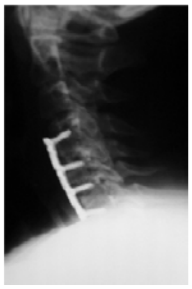
38 yo Construction Worker @ 3 weeks post-op





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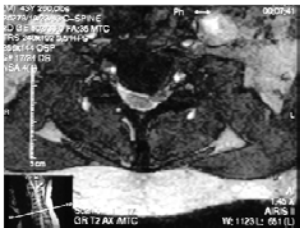
43 yo Truck Mechanic



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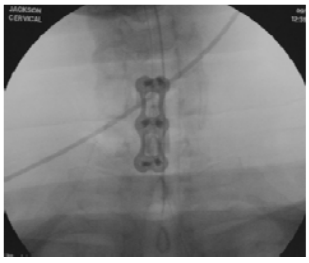
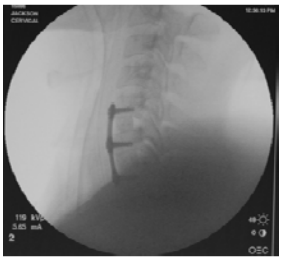
ACDF C 5-7





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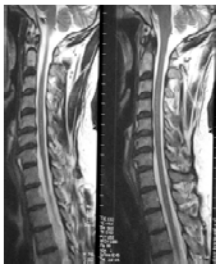
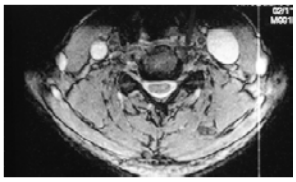
44 y.o. Retired Football Player





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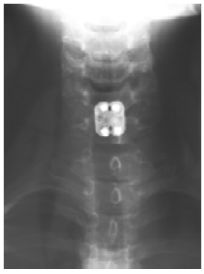
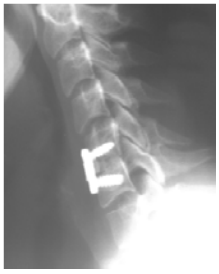
@ 3 weeks post-op





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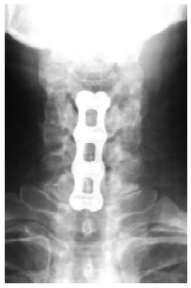
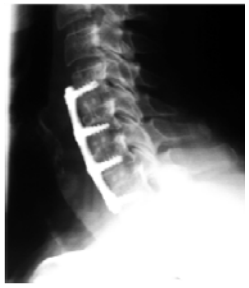
36 yo trauma





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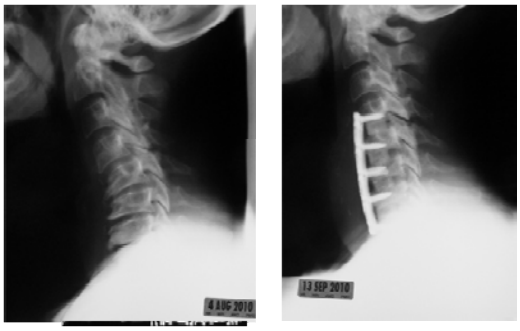
43 yo with myelopathy



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Summary

- Disc Degeneration Can Lead to Several Types of Neurologic Dysfunction
- Differential Diagnosis is Based on Symptoms, Location, and Radiographic Data
- Most Conditions Can be Managed Conservatively Initially with Good Results

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Summary

- In Refractory Cases, Surgical Treatment can Provide Excellent Results. Approach Should be Dictated by Predominant Location of the Pathology (Anterior or Posterior)
- If the Surgeon is Comfortable with all of the Options, the Best Choice for the Patient will be Available

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THE END